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## *Observations of Occultations of Stars by the Moon and of Phenomena*
## *Francisco, and at Table Mount Station,*

(*Communicated by*

*Occultations of Stars*

Observed at the *Davidson Observatory*, San

Latitude 37° 47′ 24″·1. Longitude 122° 25′ 37″·6 W.

| No. | Date. | Star. | Estim. Mag. | Phase, Im. or Em. | Observer. | Telescope. Aper. | Telescope. Power. | Chronometer. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | inches. | diams. | |
| 1 | 1881. June 11 | ? | | Im. | G.D. | 6·4 | ? | Sid. 223 |
| 2 | | c² Ophiuchi | | ,, | ,, | 6·4 | ? | ,, |
| 3 | 1882. Mar. 23 | ω² Tauri | 5½ | Im. | C.B.H. | 3·0 | 105 | Sid. 223 |
| 4 | 28 | A′ Cancri | 6 | ,, | ,, | 6·4 | 30 | ,, |
| 5 | 29 | ω Leonis | 5½ | ,, | ,, | 6·4 | 30 | ,, |
| 6 | Apr. 19 | Jupiter | | ,, | J.S.L. | 6·4 | 120 | ,, |
| 7 | | ,, | | ,, | J.J.G. | 3·0 | 105 | Sid. 207 |
| 8 | | ,, | | ,, | ,, | ,, | | ,, |
| 9 | 20 | ? | 8 | ,, | C.B.H. | 3·0 | 105 | Sid. 223 |
| 10 | 28 | ε Leonis | 4½ | ,, | F.M. | 6·4 | ? | ,, |
| 11 | May 19 | ? | 7·5–8 | ,, | C.B.H. | 6·4 | 95 | ,, |
| 12 | | ? | 7·5–8 | ,, | ,, | ,, | | ,, |
| 13 | | ? | 9–10 | ,, | ,, | ,, | | ,, |
| 14 | | ? | 8½ | ,, | ,, | ,, | | ,, |
| 15 | | ? | 8 | ,, | ,, | ,, | | ,, |
| 16 | | ? | 7·5–8 | ,, | ,, | ,, | | ,, |
| 17 | | ? | 8·5 | ,, | ,, | ,, | | ,, |
| 18 | | ? | 8–8·5 | ,, | ,, | ,, | | ,, |
| 19 | June 19 | B.A.C. 3202? | 7 | ,, | ,, | ,, | | Sid. 207 |
| 20 | 20 | 19 Sextantis | 6½ | ,, | ,, | 3·0 | 105 | ,, |
| 21 | 21 | 55 Leonis | 6 | ,, | F.W. | 6·4 | 30 | ,, |
| 22 | | ,, | 6 | ,, | C.B.H. | 3·0 | 105 | M. 7,4969 |
| 23 | | 57 Leonis | 7 | ,, | F.W. | 6·4 | 30 | Sid. 207 |
| 24 | | ,, | 7 | ,, | C.B.H. | 3·0 | 105 | M. 7,4969 |
| 25 | Oct. 17 | ? | 7½ | ,, | ,, | 6·4 | 95 | M. 7,2256 |
| 26 | | ? | 9–10 | | | | | |
| 27 | | ? | 8 | | | | | |
| 28 | | ? | 7½–8 | | | | | |
| 29 | | ? | 7½–8 | | | | | |
| 30 | | ? | 8–8½ | | | | | |
| 31 | | ? | 8 | | | | | |

There is no explanation of the

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## *of Jupiter's Satellites, made at Davidson Observatory, San California.* By George Davidson.

*the Secretaries.)*

*by the Moon.*

Francisco, from 1881, June 11, to 1882, Dec. 31.

(Telegraphically determined). Elevation above the sea 378 feet.

| Time as recorded. | | | Chron. correction. | | | Local Mean Time. | | | Local Sid. Time. | | | Remarks, etc. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| h | m | s | h | m | s | h | m | s | h | m | s | |
| 15 | 30 | 1·3 | −0 | 0 | 1·6 | 10 | 7 | 8·4 | 15 | 29 | 59·7 | During total lunar eclipse. |
| 15 | 52 | 28·3 | −0 | 0 | 1·6 | 10 | 29 | 31·7 | 15 | 52 | 26·7 | |
| 7 | 14 | 13·9 | −0 | 1 | 21·8 | 7 | 6 | 52·2 | 7 | 12 | 52·1 | Good; instantaneous. |
| 10 | 16 | 28·1 | −0 | 1 | 24·2 | 9 | 48 | 54·6 | 10 | 15 | 3·9 | Very good; instantaneous. |
| 9 | 26 | 23·0 | −0 | 1 | 25·2 | 8 | 55 | 0·9 | 9 | 24 | 57·8 | Good; disappearance gradual |
| 10 | 39 | 31·0 | −0 | 1 | 50·2 | 8 | 44 | 57·9 | 10 | 37 | 40·8 | Entire disappearance. |
| 10 | 40 | 22·5 | −0 | 3 | 8·4 | 8 | 44 | 31·2 | 10 | 37 | 14·1 | Contact. |
| 10 | 40 | 47·0 | −0 | 3 | 8·4 | 8 | 44 | 55·7 | 10 | 37 | 38·6 | Entire disappearance. |
| 10 | 57 | 21 ± 2 | −0 | 1 | 51·4 | 8 | 58 | 47·8 | 10 | 55 | 29·6 | About 11′ N. of centre; very faint and doubtful. |
| 13 | 27 | 41·2 | −0 | 1 | 59·7 | 10 | 57 | 7·8 | 13 | 25 | 41·5 | Atmosphere very unsteady. |
| 11 | 58 | 45·9 | −0 | 2 | 25·7 | 8 | 5 | 27·1 | 11 | 56 | 20·2 | Very good,* about 11′ N. of centre. |
| 12 | 4 | 29·7 | | „ | | 8 | 11 | 10·0 | 12 | 2 | 4·0 | „ 11′ S. „ |
| 12 | 6 | 52 | | „ | | 8 | 13 | 31·8 | 12 | 4 | 26·3 ± | $1^s$·5. 13′ N. „ |
| 12 | 14 | 30 | | „ | | 8 | 21 | 8·6 | 12 | 12 | 4·3 ± | $0^s$·5. 9′ N. „ |
| 12 | 26 | 56·5 | | „ | | 8 | 33 | 33·1 | 12 | 24 | 30·8 | Good. 6′ N. „ |
| 12 | 37 | 6·4 | | „ | | 8 | 43 | 41·3 | 12 | 34 | 40·7 | Very good. 1′ S. „ |
| 12 | 38 | 45·0 | | „ | | 8 | 45 | 19·6 | 12 | 36 | 19·3 ± | $1^s$·0. 1′ S. „ |
| 12 | 48 | 30·7 | | „ | | 8 | 55 | 3·7 | 12 | 46 | 5·0 | Good. 4′ N. „ |
| 14 | 31 | 18·4 | −0 | 7 | 3·1 | 8 | 31 | 4·7 | 14 | 24 | 15·3 | Pretty good. |
| 15 | 18 | 41·8 | −0 | 7 | 6·8 | 9 | 14 | 20·7 | 15 | 11 | 35·0 ± | $0^s$ 1 |
| 14 | 6 | 30·2 | −0 | 7 | 10·5 | 7 | 58 | 21·3 | 13 | 59 | 19·7 | F.W. satisfied sec. should be $30^s$·2. |
| 5 | 13 | 34·4 | +2 | 44 | 47·1 | 7 | 58 | 21·5 | 13 | 59 | 19·9 | |
| 14 | 42 | 2·8 | −0 | 7 | 10·6 | 8 | 33 | 48·1 | 14 | 34 | 52·2 | |
| 5 | 49 | 1·1 | +2 | 44 | 47·2 | 8 | 33 | 48·3 | 14 | 34 | 52·4 | |
| 5 | 28 | 44·9 | + | 36 | 24·2 | 6 | 5 | 9·1 | 19 | 51 | 2·3 | * 8′ N. of centre, approx. |
| 5 | 33 | 32 | | | 24·2 | 6 | 9 | 56·2 | 19 | 55 | 50·1 | Very doubtful 3′ S. „ |
| 5 | 40 | 26·8 | | | 24·2 | 6 | 16 | 51·0 | 20 | 2 | 46·1 | 6′ N. „ |
| 6 | 26 | 57·9 | | | 24·1 | 7 | 3 | 22·0 | 20 | 49 | 24·7 | 6′ N. „ |
| 6 | 29 | 57·8 | | | 24·1 | 7 | 6 | 21·9 | 20 | 52 | 25·1 | 11′ N. „ |
| 6 | 39 | 45 | | | 24·1 | 7 | 16 | 9·1 | 21 | 2 | 13·9 ± | $0^s$·5 15′ N. „ |
| 7 | 2 | 42·4 | | | 24·1 | 7 | 39 | 6·5 | 21 | 25 | 15·1 | 3′ N. „ |

Observer's initials in the MS.

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| No. | Date. | Star. | Estim. Mag. | Phase, Im. or Em. | Obser-ver. | Telescope. Aper. inches. | Telescope. Power. diams. | Chronometer. |
|---|---|---|---|---|---|---|---|---|
| | 1882. | | | | | | | |
| 32 | Oct. 17 | ? | 8–8½ | | | | | |
| 33 | | 15 Sagittarii | 5 | | | | | |
| 34 | | 16 Sagittarii | 6 | | | | | |
| 35 | | ? | 8½–9 | | | | | |
| 36 | | ? | 8½ | | | | | |
| 37 | 18 | ? | 8 | Im. | C.B.H. | 6·4 | 95 | M. 7,2256 |
| 38 | | ? | 8½ | | | | | |
| 39 | | ? | 8½ | | | | | |
| 40 | | ? | 7 | | | | | |
| 41 | | ? | 8½ | | | | | |
| 42 | Nov. 19 | 9 Piscium | 6 | Im. | C.B.H. | 6·4 | 95 | M. 7,4969 |
| 43 | Dec. 18 | B.A.C. 286 | 6½ | ,, | ,, | 6·4 | ? | Sid. 223 |

*Notes.*

1 and 2.—Chronometer 223 fast, May 23 = 15$^{s}$·6, June 14 = 1$^{s}$·63, June 23 = 1$^{s}$·72, rate and error derived above from last two observations.

11 to 18.—Chron. error not satisfactory; depends on rate of 223 for a twelve days interval (but from Jan. to July 1882 the daily rate of this chronometer only ranged from 1$^{s}$·0 to 1$^{s}$·2). On this day, as well as Oct. 17 and 18, the points of disappearance are taken from rough sketch made at the time.

## *Phenomena of the*

Observed at the *Davidson Observatory,* San

| | Date. | Satellite. | Phenomenon. | Phase of Phenomenon. | Obser-ver. | Instrument. Aper. inches. | Instrument. Power diams. |
|---|---|---|---|---|---|---|---|
| | 1882. | | | | | | |
| 1 (*a*) | Feb. 21 | I. | Ec. reap. | First seen | C.B.H. | 6·4 | 250 |
| (*b*) | | | | Half br. | | | |
| (*c*) | | | | Full | | | |
| | 27 | I. | Tr. ingr. | Internal contact | G.D. | | 250 |
| 3 | 27 | I. | Sh. ingr. | ,, | ,, | | |
| 4 | Mar. 5 | III. | Tr. egr. | External contact | ,, | | 250 |
| | 7 | I. | Oc. dis. | Entirely covered | C.B.H. | | 150 |
| 6 (*a*) | 16 | I. | Ec. reap. | First seen | ,, | | ? |
| (*b*) | | | | Half br. | | | |
| (*c*) | | | | Full br. | | | |

*Remarks.*

1. (*a*) Well observed. (*b*) and (*c*) very uncertain. Air somewhat unsteady.
2. Air steady. 3. Air rather unsteady.
4. Atmosphere much disturbed. 5. Atmosphere very much disturbed.

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| Time as recorded. | Chron. correction. | Local Mean Time. | Local Sid. Time. | Remarks, etc. |
|---|---|---|---|---|
| h m s | h m s | h m s | h m s | |
| 7 24 8·5 | 24·1 | 8 0 32·6 | 21 46 44·7 ± | 0$^{s}$·5 8′ N. of centre, approx. |
| 7 46 5·2 | 24·0 | 8 22 29·2 | 22 8 44·9 | 1′ S. ,, |
| 7 50 1·3 | 24·0 | 8 26 25·3 | 22 12 41·7 | 13′ N. ,, |
| 7 53 47·8 | 24·0 | 8 30 11·8 | 22 16 28·8 | ?′ |
| 7 55 23·0 | 24·0 | 8 31 47·0 | 22 18 4·2 ± | ?′ |
| 5 37 25·4 | +0 36 22·7 | 6 13 48·1 | 20 3 39·2 | * ½′ S. of centre, approx. |
| 6 3 31·5 | 22·6 | 6 39 54·1 | 20 29 49·5 ± | 0$^{s}$·2 6′ N. ,, |
| 6 11 29·7 | 22·6 | 6 47 52·3 | 20 37 49·0 | 5′ N. ,, |
| 6 18 25·9 | 22·6 | 6 54 48·5 | 20 44 46·4 | 2′ N. ,, |
| 6 30 38·4 | 22·6 | 7 7 1·0 | 20 57 0·9 | 7′ N. ,, |
| 3 53 45·9 | + 3 51 59·4 | 7 45 45·3 | 23 42 1·3 | |
| 1 36 49·4 | − 1 47·34 | 7 44 26·16 | 1 35 2·6 | Well observed. |

*Notes*—continued.

42.—Clock error unsatisfactory. It depends on rate of Sid. clock 1449 from Oct. 28, but clock has been running steadily all year. Rate from June 25 to Oct. 17 = 3$^{s}$·8 losing daily, Oct. 17 to 18 = 3$^{s}$·89; Oct. 18 to 27 = 3$^{s}$·89, and from Oct. 27 to 28 = 3$^{s}$·93. The star disappeared very close to N. horn and disappearance was to eye of observer gradual: it seemed to "glide in" during about 0$^{s}$·3. Reappearance not well obtained; first seen at 4$^{h}$ 16$^{m}$ 36$^{s}$ by chronometer, and estimated time of contact = 4$^{h}$ 16$^{m}$·4. On all other dates chronometer error was carefully observed for.

*Satellites of Jupiter.*

Francisco, during the year 1882.

| Chron. | Correction to Chron. | Chron. Time as noted. | Corrd. Local Mean Time. | Time by Amer. Eph. | App. Error of Amer. Eph. |
|---|---|---|---|---|---|
| | s | h m s | h m s | h m s | |
| Sid. 223 | −53·5 | 5 6 4·3 | 6 57 29·0 | 6 57 34·4 | − 5·4 |
| ,, | ,, | 6 30 | 57 55 | | |
| ,, | ,, | 7 18 | 58 43 | | |
| ,, | −59·0 | 6 46 8·9 | 8 13 36 | 8 7 5 | |
| ,, | ,, | 7 59 45 | 9 27 0 | 9 23 5 | |
| ,, | −66 | 7 21 48·2 | 8 25 27 | 8 23 5 | |
| ,, | −67 | 6 30 50 | 7 26 45 | 7 26 5 | |
| ,, | −75·8 | 6 53 35·5 | 7 13 54·5 | 7 13 44·3 | + 10·2 |
| ,, | ,, | 54 45 | 15 15 | | |
| ,, | ,, | 56 0 | 16 30 | | |

*Remarks*—continued.

6. (*a*) May be as much as 5$^{s}$ late; sparkle of the satellite seen almost immediately after returning eye to telescope after absence of less than 5$^{s}$. (*b*) and (*c*) Satellite III. close by for comparison.

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*Occultations of Stars*

Observed at Table Mountain Triangle, Marin Co., California, by Main Triangulation

Position of Triangulation Station $\begin{cases} 37^\circ\ 55'\ 19''\cdot3 \\ 8^h\ 10^m\ 23^s\cdot5 \end{cases}$

| No. | Date. 1882. | Star. | Estim. Mag. | Phase, Im. or Em. | Obser-ver. | Telescope. Aper. inches. | Telescope. Power. diams. | Chronometer. |
|---|---|---|---|---|---|---|---|---|
| 1 | Aug. 22 | B.A.C. 5663 ? | 7 | Im. | G.D. | 2·0 | 50 ? | M. 7,5038 |
| 2 | | „ | | „ | C.B.H. | 3·0 | 105 | „ |
| 3 | | ? | 9 | „ | „ | 3·0 | 105 | „ |
| 4 | 24 | ? | 7 | „ | „ | 3·0 | 105 | „ |
| 5 | Sept. 16 | B.A.C. 4896, 4900 ? | 7 | „ | G.D. | 3·0 | 105 | „ |
| 6 | | „ | | „ | J.F.P. | 2·0 | 50 | Sid. 223 |
| 7 | | „ | | „ | C.B.H. | 2·0 | 50 | „ |
| 8 | 21 | ? | 9 | „ | G.D. | 3·0 | 105 | M. 7,5038 |
| 9 | | B.A.C. 5920 ? | 7·5 | „ | C.B.H. | 3·0 | 105 | „ |
| 10 | 22 | B.A.C. 7016 ? | 7 | „ | „ | 3·0 | 105 | „ |

*Notes.*

1. Star first disappeared behind horizontal cross threads, and immerged while thus hidden; noted distance as above $\pm 0^s\cdot05$.

1 and 2. The chronometer error depends on set of 24 equal altitudes of Sun on this day, with rate to Aug. 24, &c. Probable error = $\pm 0^s\cdot1$.

4. The chronometer error depends on trial set of ✱ transits by Sub.-Asst. J. F. Pratt.

5. For error of chronometer in this and subsequent observations, see records at Table

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*by the Moon.*

Party, U.S. Coast and Geodetic Survey, in charge of Prof. George Davidson, Assistant.

Approximate elevation above the sea 2,592 feet.

| Time as recorded. | Correction to Chron. | Local Mean Time. | Local Sid. Time. | Remarks, etc. |
|---|---|---|---|---|
| h m s | m s | h m s | h m s | s |
| 8 15 14·5 | +2 28·5 | 8 17 43·0 | 18 23 11·1 | $\pm 0^{s}\cdot5$. See note below. |
| 8 15 15·1 | +2 28·5 | 8 17 43·6 | 18 23 11·7 | Pretty good. |
| 9 11 35 | +2 28·6 | 9 14 3·6 | 19 19 41·0 | $\pm 1^{s}\cdot0$. Very faint and doubtful. |
| 9 5 19·0 | +2 34·5 | 9 7 53·5 | 19 21 22·9 | Dark limb invisible. |
| 6 58 56·2 | +3 59·6 | 7 2 55·8 | 18 46 45·4 | Fog cloud making star and limb of moon very faint, and observation difficult. |
| 18 46 24·5 | +0 20·0 | 7 2 54·9 | 18 46 44·5 | |
| 18 46 24·3 | +0 20·0 | 7 2 54·7 | 18 46 44·3 | |
| 9 14 30·5 | +4 9·1 | 9 18 39·6 | 21 22 34·3 | Very faint; doubtful. |
| 9 45 57·4 | +4 9·1 | 9 50 6·5 | 21 54 6·4 | Good. |
| 8 9 37·3 | +4 13·7 | 8 13 51·0 | 20 21 31·6 | Very good. |

*Notes*—continued.

Mountain Triangle, 1882, time and latitude comparisons, Sept. 16, P.M.—

| | h m s | h m s |
|---|---|---|
| S. 223 = | 18 51 38·0 | 18 54 38·5 |
| M. 5038 = | 7 4 8·0 | 7 7 8·0 |

Other comparisons in record mentioned above.

In all except No. 4. the dark border of the moon was visible.

*U.S. Coast and Geodetic Survey Office,*
*Washington:* 1884, *Jan.* 22.

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